On the Antiseptic Treatment of Typhoid Fever.

by William Lockwood, M.B., 1888.

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In the whole range of disease there is none, initially as mysterious, which has been so prolific in the yield of its secrets as the life-scarce known as Enteric fever. Once admittedly uncontrollable it was allowed to run riot in fruitful fields and claim, incalculably, the lives of many who could only passively resist its superior force. Perhaps the fact of its universal distribution showed the necessity of patient and elaborate study of its processes, which, after evoking from the depths of complexity, have ultimately come to enjoy the dignity of assuredly truthful principles.
Scientific workers, so far from being discouraged by the prospect of an unequal struggle, seem at all times to have been fascinated by inherent difficulties and have, by industrious research, elucidated and defined the true position of this too frequently death-dealing disease. The sequence of events is now so generally understood and their interpretation so ordinarily applied that, far from accepting our position in regard to it, I am convinced that unremitting endeavours on both old and new lines will still further reduce the total of preventable deaths.

In this sum of benefits conferred upon the public health, instant prominence must be warmly accorded to the influence which Bacteriology has exerted upon the labours of those who have endeavoured to ascertain the true meaning of the disease-phases which essentially constitute enteric fever. Modern methods of inquiring have demonstrated beyond any doubt the highly important rôle played
by micro-organisms in the causation of disease. A sense of the ulterior effects produced by them has reflected itself in ceaseless efforts to combat their activity and, generally, to obtain such conditions as are known to be least favourable to their propagation and development.

It is now almost universally acknowledged that typhoid fever has a special form which, when introduced into the body from without, sets up by its developmental activity the features characteristic of the disease. It cannot be urged however that treatment based on this idea has met with extensive recognition in the British Islands, for though at times it has been unconsciously followed most men seem to express satisfaction with the expectant plan, which while certainly associated with the reduction in the fatality-rate shows much inscrupuity with the established pathology of the disease.

In attempting to justify more frequent recourse to specific treatment I have drawn
from literary sources a series of reports (undoubtedly based on sound and accurate observations) submitted by men who have had extensive facilities for acquiring their knowledge. The results of my own experience are also briefly indicated.

The "raison d'être" of this Thesis is best justified by the words of Sir W. Jenner who, in a celebrated lecture, (Lancet, Vol 2, 1879, p 713) said "I do not in the least degree underestimate the immense importance of numerical analysis for arriving at truth in medical subjects; and, if it were possible to find the value of the several remedies proposed for the treatment of Typhoid fever, or of its symptoms, by numerical analysis, the results of such an analysis would be real steps in our knowledge, for facts would replace opinions and doubts in regard to the influence of remedies be impossible."

Before proceeding to discuss the details of the anti-typhoid treatment of Typhoid fever I will briefly allude to recent pathological researches as
regards their bearing upon this subject. Woodhead (Lancet, Vol. 1, 1892, p. 187) says: “It is maintained that the lymphoid tissue so universally present throughout the alimentary canal is placed specially to act as a kind of defensive armour to prevent the entrance of micro-organisms that are present in the intestine. Whilst these are acting normally, no micro-organisms can make their way into the tissues but once the lymphoid tissue is removed, a by disease is rendered incapable of doing its work. The entrance of micro-organisms is allowed. Cases of enteric inflammation, where there is a destruction of the lymphoid tissues, are frequently followed by septic or pyemic conditions.” This barrier to germ-invasion is destroyed in Syphoid fever particularly, and failing effective control of intestinal putrefaction a characteristic condition of auto-poisoning is produced as fully shown by the oscillating temperature of the 3rd and subsequent weeks of the disease. Bayl (British
Medical Journal, vol. 1, 1892, p 72, and De Simone (Brit Med Jour, Feb 6, 1892, p 24) is much of the same opinion, regards the normal length of Typhoid fever, from the pathological standpoint, as two weeks, from that period forward, the disease as one of septicemia due to invasion of the necrotic tissue by pus-producing Micrococcii, and that this fact suggests antiseptics as the most rational method of treatment.

An exact analogy from the cases of infective diseases in which the efficacy of antiseptic treatment is already uncontrollable, established with the morbid changes occurring in Enteritis cannot be advanced, but I submit that of Scarlatinal throat-ulceration as affording the nearest possible parallel. Both agree in showing inflammatory and destructive changes produced by attendant forms and, as far as the scarlatinal process is concerned, it cannot be denied how completely the application of antiseptic substances succeeds in combating the virulence of the
infective agent. Woodhead, (Lancet vol 1, 1892, p.187) insisting on the function of the pharyngeal lymphoid tissue to prevent the entrance of micro-organisms, points out that, in cases of Scarletina where there is necrosis or suppuration of the pharyngeal glandular tissue, acute septic and septicemic conditions frequently follow. I have seen this septicemic state in the later stages of many cases of Scarletina.

The situations of the lesions in Scarlet fever do not preclude, quite distance, the influence of remedies designed to avert the intensity of the morbid process. Furthermore, the intestinal canal, per se, offers no insuperable hindrance to its own disinfection but, on the other hand, by the fact that it is continuous and unbranching, affords very facility for the realisation of our destined purpose. Much evidence strongly points to an expectation of a power of control over the life-conditons of the typhoid from and the feeling cannot be restrained that, by introducing remedies...
which prove unfavourable to the cycle of bacterial growth, we really can inhibit the development, or expel them when formed, or counteract the effects which the reception of poisons, made by them, produces.

Many remedies have been introduced at various times with the object of checking altogether, or modifying when established, the course of Typhoid fever. The chief are i. quinine (for its general effect), oil of eucalyptus, β-naphthol, naphthalene, salol, carbolic acid, calomel, chlorine, iodine, and sulphurous acid. Of these, many reach the intestinal mucous membrane without undergoing change. Their energy is liberated where it is most wanted, viz. in the small intestine, thus securing a beneficent and healing local action to the congested and ulceratedeyer's glands. Others, however, are undoubtedly altered in the stomach but it is interesting to observe that, even with these, many ameliorating conditions are obtained. Brunton (Pharmacology, and
Therapeutics."[82] Says, in reference to the internal administration of antiseptics, "All that we can hope to do is to turn the scale, if possible, in favor of the organisms in the struggle for existence between the cells which compose it and the bacteria which have invaded it. Our hope of doing this rests upon the fact that drugs which may be injurious both to the tissues and to the bacteria are not equally so to each."

Under the belief that when once the germ is introduced, enteric fever is bound to run its ordinary course, the so-called abortive treatment is regarded by many as unsound in principle as it is unestablished in fact. They question, when its occurrence seems certain, the justice of the diagnosis, and of this objection be overcome, argue that a very mild type of the disease has been encountered. The conclusions arrived at by other authors expressly declare that abortive treatment is frequently successful if they claim the result as often happening in their practice.
There is a remarkable consensus of opinion that, when treated by antiseptic remedies, the duration of the fever is shortened, particularly that period due to systemic infection occurring after the first fortnight of the disease. The arrest of putrefaction, which it should be our first object to secure, must surely prevent the products of putrefaction from being conveyed to the mesenteric glands, and the constitutional effects, due to the reception of poisons, must be averted by destroying them as soon as formed. An intense and prolonged febrile process powerfully perverts these agents which are most active in maintaining bodily nutrition.

Metabolic activity is always increased under the stimulus of high temperature and, aided by a toxin-laden blood, ultimately reacts on protoplasmic structure in excretory glands, cardiac fibre, nerves and muscles, and secures its gradual degeneration. Therefore, by lessening fever, the strain thrown upon such tissues as are least able to resist it is effectively moderated.
by abolishing the conditions which produce disturbances of bodily heat. (Woodhead, "Lancet," vol. 1, 1892, p. 302.)

Catin ("Brit. Med. Journ.," vol. 1, 1892, p. 578 - his report is inaccurate, but I have the results verified in a private communication) has recently published an analysis of 37 cases specially to show the average duration of the fever under different methods of treatment. It may be summed up as follows:

<table>
<thead>
<tr>
<th>Method</th>
<th>Number of Cases</th>
<th>Mortality</th>
<th>Average Duration of Fever in Days</th>
<th>Average Stay in Hospital in Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Expectant</td>
<td>18</td>
<td>6.25%</td>
<td>36</td>
<td>52.5</td>
</tr>
<tr>
<td>2. Salicylates</td>
<td>6</td>
<td>nil</td>
<td>30</td>
<td>52</td>
</tr>
<tr>
<td>3. Antiseptic</td>
<td>13</td>
<td>nil</td>
<td>23 1/2</td>
<td>44</td>
</tr>
</tbody>
</table>

(The antiseptics used were either 3 1/2 pills of baryta thiosulphate or 1 1/2 pills of iodolnnae, given twice daily.)

It would naturally be expected that the most obvious results accruing from intestinal antiseptics would show themselves in connection with the special signs referable to the lesions in the bowel.
Diarrhea tells with such an unmistakable effect upon the strength of a patient that any rational plan designed to avert its serious development ought not to remain an uncertain therapeutic resource in the treatment of it. Let putrefaction be controlled and the evacuations will be found to progressively diminish in number. The intestine will show less signs of irritation and will be better enabled to tolerate the events happening in its interior. The factor of the stools is uniformly and quickly subdued, a fact affording evidence of the activity of the remedy employed and the success of the principle involved in its use. And the same explanation holds fully as regards tympanites. The presence of an already favourable soil for germ-growth in the bowel is reinforced by the addition of dead and dying matter thrown off as sloughs from the ulcerated surfaces. What wonder then, that we hear of barrel-shaped abdomens and the resumption of the normal, or even scaphoid, shape as soon as the manufacture of gas is
effectually stopped? These extreme degrees of typhoid ought not to be allowed to occur and the prevention of them lies in early recourse to the antiseptic method of treatment.

The tapers is found quickly to become clean and moist and the skin to lose its dryness and harshness.

Some authors claim that, under the method, an increased capacity for assimilation of food is obtained as manifested by rearrangement of the intense depression and the altered appearances of the dejecta.

There is no doubt that, provided a reduction in the duration of the fever, a more rapid convalescence is sure to follow and this I have myself frequently observed. The system is more able to effect its recuperation if tissue-destruction is minimized and the nervous matter spared the deleterious effects of ptomaine-poisoning.

There is a more frequent immunity from serious complications, but probably no kind of treatment
can save certain cases of intense intestinal ulceration from destruction. It is, of course, impossible to affirm that a case treated by the expectant plan ending fatally, say from perforation, would not have been overtaken with disaster if the antiseptic method had been employed vice versa. It would too be highly unwise to contend that this plan of treatment has furnished us with weapons to cause the total disappearance of such accidents as ulceration, hemorrhage and perforation. But it seems fair to suppose that, by directing our efforts solely against the cariesative agent, we should be more able to avert the complications arising in the course of the disease.

The fatality rate is the great tribunal before which methods must amply justify their claims to a position among recognized therapeutic aids. For comparison, at a glance, I will here give two tables, the first shewing the average mortality of expectant, & the second that of antiseptic treatment. It will thus be easily observed how favourably these statistics speak for the value of the specific plan.
<table>
<thead>
<tr>
<th>Author</th>
<th>Reference in literature.</th>
<th>Number of cases</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Murchison</td>
<td>On continued Fever, 2nd ed. p 608.</td>
<td>?</td>
<td>17.26%</td>
</tr>
<tr>
<td>Jacquelot</td>
<td>Med. Times, Apr. vol. 1 1583, p 223.</td>
<td>80149</td>
<td>19%</td>
</tr>
<tr>
<td>[1888 - 1890].</td>
<td>by private letter.</td>
<td>?</td>
<td>16.35%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Author</th>
<th>Reference in literature.</th>
<th>Drug employed.</th>
<th>Number of cases</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilks</td>
<td>Brit. Med. J., 1870, p 579.</td>
<td>Sulphuric Acid</td>
<td>171</td>
<td>0.0%</td>
</tr>
<tr>
<td>Kesteven</td>
<td>Pract., vol. 1, 1885, p 343</td>
<td>Eucalyptus Oil</td>
<td>220</td>
<td>1.8%</td>
</tr>
<tr>
<td>Bouchard</td>
<td>Traite de Maladies Infees 1889, p 43.</td>
<td>B-naphthalene</td>
<td>390</td>
<td>11.7%</td>
</tr>
<tr>
<td>Liebensteiner</td>
<td>Pract. de Med. in Cyclopedia 1884, p 195.</td>
<td>Iodine</td>
<td>239</td>
<td>14.6%</td>
</tr>
<tr>
<td>do</td>
<td>Ibid., vol. 1, p 200.</td>
<td>Calomel</td>
<td>223</td>
<td>11.7%</td>
</tr>
<tr>
<td>Grantham</td>
<td>Lancet, vol. 1, 1888, p 1143.</td>
<td>Carbidic Acid</td>
<td>116</td>
<td>9.8%</td>
</tr>
<tr>
<td>Pearson</td>
<td>Lancet, vol. 2, 1885, p 520.</td>
<td>Le Squi; Chlo-</td>
<td>100</td>
<td>1%</td>
</tr>
<tr>
<td>Epton</td>
<td>Lancet, vol. 2, 1884, p 703.</td>
<td>Calomel</td>
<td>235</td>
<td>5.5%</td>
</tr>
</tbody>
</table>

I shall now deal with each remedy separately.
Quinine, from its great importance, demands a first place. The breaches of bowel-surface produced by the characteristic changes render the passageway of bacteria themselves, and of their products, into the blood a matter of comparative ease. Introduced in such a way, the infective agents are free to exert their effects upon structures already weakened in their powers of resistance. Whether poisoning muscle, febrile, nervous, matter or bone, the evidence is unequivocal that tanns are spilling the blood current. It is with a view of combating their influence that quinine is employed; it thus carries out the larger idea of antisepsis. Barcharis ("Thérapeutique des Maladies Infectieuses," 1889, pp. 321-322) is of opinion that its power of reducing fever in this disease is due to its antisepptic influence upon the blood, and he insists upon its administration for this reason. He gives 30 grains in the evening, during the first two weeks, in four equal doses of 71/2 gs. each, every half-hour, at intervals of three days (equalling 10 gs. daily).
In the third week, the 30 fps are reduced to 22 fps, and in the fourth week, to 15 fps. Bichard speaks very enthusiastically of the results he obtained by the use of quinine and a local intestinal antiseptic, and he was able to announce a decrease of one-third in the death-rate of the hospital to which he was attached.

Pechet ("Lancet," vol. 2, 1886, p. 410) administers quinine in daily doses of not less than one gramme from the very first day of the illness. He is of opinion that this is the means of causing the premature termination of ordinary cases of Syphilitic fever.

Cleveland ("New York Medical Record," 1886, p. 362) believes in the power of quinine to abort some cases of Syphilitic fever, to shorten the duration of others, and to ameliorate the symptoms of most. His plan is to begin with a large test-dose of 5-10 fps, given every fifteen minutes for two hours. At other times, he gives from 5-10 fps every two or three hours, his idea being that as quinine
is rapidly eliminated, it is necessary to keep patients under its influence. Cleveland has observed that patients with whom its acts were never more rapidly, more permanently and with fewer sequelae; and he has been much impressed with the fact that the death-rate is much lower with the quinine treatment than with the expectant plan.

**Colchicin** — Mercury is well known to act as an especially disinfectant of the intestinal contents. Brunton (Pharm. and Therap., p 85) says that "its beneficial action may be partly due to its anti-septic power not being greatly diminished by admixture with fecal matters, and he quotes Wassileff's statement to the effect that colchicin powerfully retards the decomposition due to two organisms. I can fully endorse this claim for it from its use in those cases of gastro-intestinal in children which are accompanied by green and foul-smelling stools. One has also seen brilliant
results from its early administration in cases of Typhoid fever and I have specially quoted at length one of Broadbent's cases to show the indications when the virtues of its administration are most to be expected. Of course it is dangerous to supply it after the 8th day of the disease, for the softened condition of the bowel-wall has only to be remembered to make its use after that date absolutely prohibited. Liebermeister (Cyclopedia Pract. Med., 1st. van Ziemsen, vol 1. p 200) believes that calomel exerts a specific influence. He gives it in every case before the 9th day of the fever, usually about 8 grs. for a dose, three or four times in the first twenty-four hours. Eight hundred cases treated in this way yielded excellent results. The rate of mortality in cases otherwise treated precisely alike was decidedly lower. He believes that it materially shortens the duration and lessens the intensity of the disease.

Elstein ( Lancet, vol 2, 1884, p 703) treated
235 cases with calomel. The mortality was 5.5%. He is inclined to believe that the so-called abortive treatment with calomel is useful and is to be recommended.

Niemenen ("Text-Book of Practical Medicine," Vol. 2, p. 147) states: "After the accurate observations of Wunderlich we can scarcely doubt that by this remedy (calomel) we may, in some few cases, cut short the disease (according to Wunderlich, one or two 5-gr doses are enough), and that in the great majority of cases when this remedy is given during the first week and before the occurrence of much diarrhea, the course of the disease is rendered milder and shorter. The experience of Pfeiffer's clinic, as well as my own, perfectly agrees with Wunderlich.

A most interesting case is related by Broadbent ("Brit Med Jour," Vol. 2, 1890, p. 781) in which the recognition of stomain poisoning from the intestinal canal explained obscure and dangerous symptoms and was the clue to effective treatment. The patient was seen about the 14th day of the disease.
The initial symptoms had been fairly characteristic, the temperature range low, there was no abdominal distension, the bowels were constipated and there was extreme nervous prostration and constant vomiting of greenish liquid. The patient was so weak that he could not turn in bed. The pulse was very frequent, extremely small, short and weak; the feet and knees were cold and clammy; and the hands swollen, cold and livid. It was obvious that the nervous system was overwhelmed by some poison and probably such poison was manufactured in the intestine by bacteria and absorbed. Clearly, the patient's only chance was that the bacteria and their products should be swept away from the intestinal canal. The bowel lesions fortunately could, in this case, be disregarded, there being no local tenderness, no abdominal distension and no intestinal catarrh. Three grains of Calomel were therefore administered, as best suited to serve the double purpose just mentioned. The next day the patient was relieved, all the unfavourable symptoms
cleaned away, and the case pursued a normal course and ended in recovery. 

De Simone (Brit. Med. Jour.; Epitome, Feb 6, 1892, p 244) was led to try the effects of calomel in typhoid fever from his experience of it in epidemics of cholera and dysentery. He concludes (1) that calomel is an excellent intestinal antiseptic (2) Small doses are powerless to arrest the fever of the first period of typhoid, but completely cut short that of the later period (3) They act, in this case, as antiseptic disinfectants of the typhoid ulcers and protect them from the pathogenic microbes of the intestine. (It will be remembered that De Simone regards the fever of the 3rd and subsequent weeks of the disease as being septic in origin.)

I have selected these reports for their conciseness and suitability from the very many contained in medical literature.

The aromatic series of the carbon compounds contains some exceedingly useful intestinal disinfectants,
among which are naphthaline, β-naphthol, carbolic acid and Resorcin. I shall also include Scopol in this group from its chemical alliance with two members of the series.

The most marked action of these substances is their antiseptic power, which, in the case of β-naphthol and naphthaline, in account of their insolubility is maintained throughout much of the length of the digestive tract. They thus fulfil the necessity of producing a great degree of acridity of the intestinal fluids. (Brenton (Pharm. Therap.) 1743) says that, when given internally, naphthaline disinfects the whole of the bowel-contents "from the stomach to the rectum" and that "it may be used wherever it is desirable to destroy germs & stop processes of putrefaction or fermentation in the intestine." He adds that "naphthaline has little or no poisonous action on the higher animals, the reason probably being that it is not absorbed in sufficient quantity from the intestinal canal to be injurious to the organism."
Wolff (Philadelphia Medical News, vol 58, p 571) used raphtholatin in 100 consecutive cases of Typhoid fever. The following was the plan of treatment: On admission, calomel with soda was administered in one-pound doses every 3 hours for 6 hours or until its laxative effect forbade its further use. This was immediately followed by saline capsules containing 5 grains of purified and finely-powdered raphtholatin, very few hours. No other medication was permitted, excepting chemical antiperistalsis and cold typo-jury for hyperpyrexia. Of the 100 patients, 56 were males and 44 females; their average age was 24.7 years and the mean duration of the febrile process was 24.4 days. Sixteen cases ran an abortive course, defervescing before the end of the second week. Only 3 of the patients had intestinal hemorrhage; in 2 of these the complication occurred shortly after the raphtholatin treatment was begun. The total mortality was 10%, but 2 cases were brought in comatose and never rallied, dying within 3 hours after admission; 4 others died of accidental
complications, while of the remaining 14, two died within 4 or 5 days respectively after admission. The mortality statistics of the German Hospital, Philadelphia, prior to Wolff's observations, averaged 17.1% (1884-1888). Although naphthol had no direct influence on the febrile temperature, Wolff found that its continued administration speedily produced lysis and thereupon the temperature became normal. It was continued for some time after complete defervescence and the frequency of relapse was greatly diminished. The appetite was not affected, nor was any renal irritation observed. Wolff has no doubt that, at the onset of Syphilitic fever, naphthol may inhibit the development of the pathogenic microbes so far that the disease will be aborted, and further that at any period of the disease, over-production of the chemical toxins may be prevented and the fever made to run a mild course.

Naphthol. Bouchard (Théorie des Maladies)
Infect," 1889, p. 29 et seq. + chap. 30-31) recommends β-naphthol reduced to a fine powder and mixed with salicylate of bismuth in the proportion of 150 grains of the former to 75 of the latter, and the whole divided into 50 powders. From three to twelve of these are given in the 24 hours, enclosed in a wafer and swallowed with the food. Quinine was also given internally (vide ante). The results obtained showed a reduction in the mortality of 9.36% (from 21.15% to 11.79%). Again, Bouchard ("L'Unime Medicale," August 24, 1886, quoted by Klosteren, Practitioner, vol. 1, 1887, p. 258) mentions that after the employment of naphthalin and methyl-naphthalin, he obtained fecal matters nearly free from microbes and ascertained that these had lost their virulence.

M. Clarke ("Practitioner," vol. 2, 1888, p. 421 and vol. 2, 1889, p. 1) gave naphthalin in 5 cases, in doses of from 3 to 4 grains every two hours, and when the diarrhoea was checked, the same dose every three hours during the whole
period of pyrexia. He advises its administration in the form of pills coated with keratin. All the cases did well; two were severe and protracted. Clarke summarizes his results as follows:

1. Reduction in the average duration of the fever.
2. Stools became much less offensive.
3. Diminution of abdominal tenderness & meteorism.
4. Early cleansing of tongue & less dryness of mouth slips.
5. Absence of albuminuria.
6. Convalescence more rapid & strength less reduced.
7. Less risk of propagating the disease to others.
8. Tendency to Secondary complications diminished.

Petresco (Lancet, vol 1, 1870, p 1138) obtained remarkable results with β-naphthol. Forty-five to sixty grains were given per diem.

Under this treatment, he lost only 4% of his cases. The whole course of the disease was rendered milder, and there was a remarkable immunity from serious complications.

Carbolic Acid. The action of phenol on
the kidneys has always rendered dubious the advis-
ability of giving anything like large doses in enteric
fever. The maximum amount used by any one
of the authors of the annexed reports was 3 drops,
three or four times daily.
The powerful influence of carbolic acid, apart from
the body, upon the processes of decomposition and
fermentation and upon similar changes in the
stomach are notorious. The results recorded seem
to claim for it like effects upon such processes
in the intestinal canal. Grasshaw (J. Lancet,
Vol. 1, 1888, p. 1243) treated 116 cases, with one
death, with 1/2-minim doses of carbolic acid
combined with 2-minim doses of tincture of
iodine in syrup of orange, given every four hours
for the first two weeks, or until urgent
symptoms yielded when the same doses were
given three times daily. If the mixture caused
vomiting, the dose of carbolic acid was reduced
of nitro-hydrochloric acid added. Grasshaw
says "I am fully convinced that the medicine
frequently causes the fever to be cut short in the second week...... The first effect is manifested almost immediately. In two days, the pulse slows, pains in strength, temperature falls, the tongue becomes moist, all diarrhoea ceases, and the general condition is so much improved...... The case quietly progresses towards recovery...... I firmly believe that the presence of carbolic acid in the system either arrests the production, or destroys the already produced, typhoid bacilli.

Peace (Brit. Med. Jnr.: vol. 2, 1887, p. 157) reported 30 cases of typhoid fever treated with carbolic acid. He gave it in one to 3-drop doses, three or four times daily. The duration of the disease was shortened and all the patients recovered.

Salol—Salol undergoes no change in the stomach; it retains its composition until it meets with pana-
cratic juice, and by it is split up into its phenyl and salicyl elements. Its use is therefore unattended
with any gastric irritation. Adults take the
plain powder just on the tongue; it is better to
make an emulsion for children. No change in
the urine appears after free and continued ad-
ministration of salol; it is to be inferred from
this that it parts with its phenyl very slowly,
a result most to be desired.

Goelot (New York Medical Journal, vol 146, p 1148)
says "In typhoid fever, every 3 hours, there is
nothing better (than Salol). While I cannot say
that it shortens the attack, it relieves the
excessively disagreeable odour of the faeces,
tenesmus and flatulence...... In one case
..... showing strong suspicion of typhoid fever,
Salol in 10-30 doses, every 2 hours, relieved the
condition and in a week the symptoms had
disappeared. I believe in this case typhoid fever was aborted. I am the more willing to believe this after I have seen some of the prompt relief afforded by Salol in the severe bowel trouble of genuine typhoid fever.

Cahall (Practitioner, vol 1, 1891, p53) has tried Salol in many cases of typhoid fever coming under his care during the past two years and speaks very highly of its effects. Three grains were given, day & night, in the form of powder. Under its influence, he found tympanites disappear, and diarrhoea, no matter how severe at the commencement, progressively improved and required no further special treatment. The temperature seldom rose after the first day of treatment, and after the first week, it steadily and more or less rapidly, fell. The pulse did not show the usual increase in frequency and seldom exceeded one hundred per minute. Alcohol was not used. The only untoward effect observed was a partial suppression of urine in some cases, but in no instance was it
necessary to suspend the treatment on this account. The average duration of 16 cases treated by this method was 17 days, and the only complication met with was pneumonia, which was present in two cases.

Resorcin——I have been unable to obtain more than one report concerning the use of resorcin in Typhoid fever. It possesses, however, very considerable antiseptic power.

Jodere (Camet, vol 2, 1891, p 245) employed it, with considerable success, in doses of 10 gr. combined with the same quantity of acetanilid, every 3 hours. He found that a remarkably beneficial action was exerted upon the general condition of the patient.

[Butler, Pharrm. Therap. p 741] speaks very favorably of its use as an intestinal disinfectant in cases of infantile cholera.

Chlorine & Lq. Sodii Chlorinata——The

fascinating form of antiseptic is regarded by many as being the most suitable from its power to disinfect
not only the contents but the intestinal walls themselves.
Gases are readily absorbed by the bowel and passed into the blood.
My own experience with a solution of chlorine has been very satisfactory. I have seen it shorten fever, clean the tongue, deodorise evacuations, and hasten convalescence.

Murchison ("On Contagious Fevers", 3rd ed., p. 652) repeatedly found "Chlorine to have a beneficial effect upon the abdulinal symptoms." He administered it in an acid solution.

In a very fascible work upon the subject, Yes ("The Treatment of Typhoid Fever," pp. 31-34) draws attention to the advantages of a solution of chlorine combined with quinine, of which 12-36 grains are given in 24 hours. The results observed were:

1. Modification and sustained depression of the febrile temperature.
2. Abbreviation of the average course of the fever.
3. Remarkable maintenance of the physical strength and intellectual clearness of the patient, so that
there was far less need of stimulants.
4) Greater power of assimilating food.
5) Remarkable clearing of the tongue.
6) Deodorisation of the evacuations.
7) More rapid and complete convalescence.

Jep's cases were not very numerous but they were
endurentive and all did well. His very mild
cases were not actively treated.

Bayl (Brit. Med. Jour., vol 1, 1892, p 72) prefers to
administer chlorine in an alkaline medium that
will readily form with the feces in the bowel.

One-fourth of the cases treated with Liq. Sod. Chlor.
ended their fever in the 12th to the 16th day, a
result which, he says, could not be achieved by any
other method.

Over 100 cases were treated in a similar manner
by Pearson (Lancet, vol 2, 1885, p 520 and vol 2,
1891, p 1273) who remarks that his "faith in
the remedy is complete" and that "it will be
found by all who give it a trial as a specific
agent against the forms of Typhoid fever."
Fifteen minims were given every 3 hours. The mortality was 10%. Pearson adds that "when the remedy was given at the very beginning of the illness, immediately after the chill and before the symptoms were fully developed, it appeared to modify and shorten the disease considerably, the cases lasting only about a fortnight.

Iodine — so far as this country is concerned, iodine does not appear to have been at all extensively tried. Some German authorities speak very favourably of it. Diebenmister (Cyclopedia Pract. Med.; Vol. 4, p. 667.) used a solution of iodine in iodide of potash and gave a dose every 2 hours. (The formula was: — Iodine 1 part. Iodide of Potash, 2 parts. Water, 10 parts.) Two hundred and thirty nine cases treated in this way saved a mortality of 14.6%.

Again, Niemeyer (Text-book of Prat. Med.; Vol ii. p 648.) says "Wellebrand has lately recommended iodine as a specific in Typhoid

Feber, 5% Iodine solution, in goat serum, given hourly, and after the second dose every 2 hours, which saved a mortality of 4%."
fever, and the results published by him... urge us to make more trials with the preparations of iodine in this disease... It is said that soon after the two or three days of this treatment, there is a decided remission in the temperature, ulcers do not come on the jaws, or they disappear early, the fever ceases in an unusually short time.

Oils of Eucalyptus and Turpentine. These volatile and closely-allied oils are both disinfectant and stimulants to ulcerated mucous surfaces. They are probably partly excreted by the intestines— at any rate those who have employed Eucalyptus testify to the fact that its particular odour is communicated to the evacuations. It is thought by some that the volatile oils, when given freely by the mouth, get into contact with the mucous membrane of the upper intestine in the form of vapour. Eucalyptus resembles quinine in many of its actions, and Brunton (Pharmac. Therap., p 85)
regards eucalyptol as being more beneficial in some cases of septic poisoning than quinine. Attention was first prominently directed to the value of eucalyptus oil in typhoid fever by Kesteven who treated 220 cases by it, with 4 deaths. (Practitioner, Vol. 1, 1885, p. 343, & Vol. 1, 1887, p. 225) He gave the oil in doses of 5-10 minims made into an emulsion with mucilage. Every 4 hours, combined with sal-volatile, spirits of chloroform, and strychnine. The beneficial effects noted were:

1. Reduction of the pulse.
2. Remarkable lowering of the temperature.
3. Rapid cleaning & moistening of the tongue.
4. Skin became soft & moist.
5. The duration of the fever became greatly shortened.

The omission of the remedy was followed by a return of the unfavourable symptoms. Benjamin Bell (Braithwaite’s “Retrospect,” Vol. 2, 1881, p. 29) prescribed a teaspoonful of tincture of eucalyptus, well diluted, at regular intervals of 3 or 4 hours in all cases of typhoid fever.
His distinct impression was that, as a rule, the duration of the disease was shortened and the tendency to diarrhea diminished.

Wood (Treatise on Therapeutics, p 133) gives oil of turpentine in every case in 10-drop doses every two hours during the day and every three during the night. He says that it "almost acts as a specific" when the ulcers are slow to heal and claims that this fact establishes the certainty of its action being largely local. He believes that many lives would be saved if it were more freely used. (This Thesis is not concerned with the value of turpentine in intestinal hemorrhage).

Pyropeol is insoluble in the stomach and is innocuous in full doses. It possesses an antiseptic power four times greater than that of carbolic acid, it is also more permanent in its action and less irritating to mucous surface. 

Testi (Brit. Med. Jour, vol 1, 1889, p 450) gave it in 150 cases with good results.
He noticed:

1) Lowering of temperature.
2) Disinfection of the intestinal tract.
3) Diminution of diarrhoea & tympanites.
4) Diminution in the products of putrefaction developed in the intestine and eliminated by the urine.

Sulphuric Acid was given by George Wilks (Brit. Med. Jour., 1870, p. 597) in doses of 3-20 minims, every 4 hours, with syrup of orange-peel, and continued for 7 days or more until its physiological action was declared. He treated 171 cases with no death and most were convalescent within 15 days of commencing the treatment. Wilks found that sulphuric acid quickly alleviated vomiting & purging, reduced tympanites, supported the pulse, moistened the tongue and relieved thirst. He claimed for it "that it arrested the further development of the poison, and by continuing this arrest long enough, determined the fever.
and briefly, that it was an antidote. Its omission
was almost invariably attended by a relapse.

The series of clinical reports are now exhausted,
but I thought that, for completeness’ sake, a few
remarks on **Management as to Diet** were necessary.

**Therapeutic Incequity** does not limit the
scope of antiseptic treatment, for its successful
application equally depends upon strict attention
being paid to the correct principles of feeding
our patients. The food must be such as will
be dealt with by the **Stomach & duodenum**
and as little as possible by the lower part of the
**Small intestine**. A more or less temporary suspension
of _gastric_ functions occurs when fever is present
and therefore our desire should be to avoid
intestinal _overloading (irritation)_ and of such
material as affords suitable fuelburn for
** fjewr-life. Jenner (Quartet, vol. 2, 1879, p 717)
say, “About the latter half of the 3rd & during
the 14th week of the fever ....... hence fever is
at its lowest, the contractile energy of the abdominal
intestinal muscles is consequently at its minimum,
while from the state of the stomach and resting-place.
Generally, the antiseptic digestive processes are in
a great degree arrested, so the food... readily
undergoes gas-generating decomposition.” He calls
attention to the evil of using milk as a beverage
instead of as a food. (Cited, p. 716) declares that
the almost indiscriminate employment of milk
in almost unlimited quantities, as diet in fever,
has led to serious troubles... Undigested curds
may accumulate in the bowel, inducing flatulent
distension, pain in the abdomen, restlessness,
increased febrile disturbance... irritate the
bowels; produce, keep up, or greatly increase diarrhea.

The diet chiefly recommended by me for an
adult, during 24 hours, consists of (about) 3
pints of milk, slightly alkalinised by the
addition of bicarbonate of soda & common salt;
3-4 ounces of raw-beef juice, which is made
c as follows:—1/4 lb of lean raw beef is scraped
into a sauce, covered with cold water, left for an hour & then is strained through muslin. The beef-juice may be replaced by either mutton- or chicken-broth. Strained fruit-juice, barley-, lemon- & pure water may be taken to quench thirst.

It is necessary to refer to the not uncommon practice of locking-up the bowels (with the effect of paralysing faecal discharge), an evil which undoubtedly leads to a prolongation of the disease & increases the risk to the patient. Woodhead (Lancet," vol. 1, 1892, p. 187) advises that "the intestinal tract should be kept free from accumulations of effete matter: first, in order that such matter may not be reabsorbed; and secondly, to allow of a free passage outwards of any substance which may interfere (a) with the free action of the leucocytes and of the other cellular tissues, and (b) with the normal constitution of the fluids of the body."
Conclusion — After weighing the views presented by so many authors, an impartial critic must surely be powerfully impressed by them. The advocates of the method of specifically treating Typhoid fever are totally unanimous as to its rationale; they only differ in their use of the means. A want of conviction can surely no be urged and I would specially point out that the disease in question offers too tempting a field for the employment of therapeutical measures to be wholly ignored. Evidently suitable remedies are forthcoming to effect our purpose.

Our text-books mostly advise us to interfere as little as possible viz.; diet suitably, nutrient drenches to relieve complications. These methods are efficacious because as far as they individually aid in establishing intestinal antisepsis, they are mainly secured by realizing the idea of the specific cause of the disease.

Fixed adherence to, and routine practice of, any plan cannot be too strongly deprecated.
we can be no more rigidly followed than another can be uniformly recommended. The balance of evidence in favour of any given method can only be estimated by conclusions derived from practical experience.

In this thesis, I have tried to urge the adoption of the antiseptic treatment of typhoid fever from personal knowledge of the certain benefits to be derived from its employment. When encountering any one of the possible disasters of this disease, it would, at any rate, be less disconcerting if we had not failed to profit by every known resource in the management of an affection which too often begets unavoidable death.